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EXAMINER	
OVEISSI, DAVID M	

ART UNIT	PAPER NUMBER
2416	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)
	10/801,624	KADOUS, TAMER
	Examiner	**Art Unit**
	DAVID OVEISSI	2416

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 May 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-19,21-24,26-29 and 31-49* is/are pending in the application.

4a) Of the above claim(s) *2, 20, 25, and 30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-19,21-24,26-29 and 31-49* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 2, 20, 25, and 30 have been cancelled.

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 5th, 2009 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 1, 3-19, 21-24, 26-29, and 31-38 have been considered but are moot in view of the new grounds of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 3-7, 9-19, 21-24, 26-29, and 31-49 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

For claims 1, 7, 10, 13, and 41 the phrase “selected rate” is vague and infinite. Applicant’s paragraph 6 defines “rate” as data rate, or information bit rate, a particular coding scheme, a particular modulation scheme, a particular data packet size, and so on. It is not clear from the limitation which of the above is chosen. In addition, examiner disagrees with the above generalization for example the packet size is measured in bits whereas data rate is measured in bit per second.

For claims 1, 3-7, 9, and 39-40 are rejected because of their dependency from claim1.

For claim 5 the recited limitation “receiving a negative acknowledgment (NAK) is vague and indefinite. It is not clear what caused NAK message. It is also not clear which element receives the NAK message.

For claim 6 the phrase “if at all” is vague and indefinite.

For claim 9 recites the limitation "Np data packet”. There is insufficient antecedent basis for this limitation in the claim.

For claim 9 recites the limitation “N_p data packets”. There is insufficient antecedent basis for this limitation in the claim.

For claims 11-12 are rejected because of their dependency from claim 10.

For claim 14 is rejected because of their dependency from claim 13.

For claim 15 the recited limitation “obtaining a block of detected symbols” is vague and indefinite. It is not clear what kind of detector is being used (example error detector). It is not clear what a detected symbol block is.

For claims 16-19, 22, 42, and 49 are rejected because of their dependency from claim 15.

For claim 16 the limitations “obtaining a block of received symbols for the data symbol block” and “detecting the received symbol block to obtain the detected symbol block are vague and indefinite.

For claim 17 is rejected because of their dependency from claim 16.

For claim 21 the limitations “obtaining a block of received symbols for the data symbol block” and “detecting the received symbol block to obtain the detected symbol block are vague and indefinite.

For claim 21 the recited limitation “determining a rate for data transmission based on an average spectral efficiency for the plurality of transmit antennas” has no relation with the previous limitations of the claim 21 therefore it is vague and indefinite.

For claim 22 the recited limitation “back-off factor” is vague and indefinite. It is not clear what this back-off factor is.

For claim 22 the recited “selecting a rate” is vague and indefinite. Applicant’s paragraph 6 defines “rate” as data rate, or information bit rate, a particular coding scheme, a particular modulation scheme, a particular data packet size, and so on. It is not clear from the limitation which of the above is chosen. In addition, examiner

disagrees with the above generalization for example the packet size is measured in bits whereas data rate is measured in bit per second.

For claim 23 the limitations “obtaining a block of received symbols for the data symbol block” and “detecting the received symbol block to obtain the detected symbol block are vague and indefinite.

For claims 24 and 43 are rejected because of their dependency from claim 23.

For claim 24 the recited limitation “a detector operative to obtain a block of received symbols for the data symbol block and to detect the received symbol block to obtain the detected symbol”. It is not clear what type detector is used and what is being detected.

For claim 26 the limitations “obtaining a block of received symbols for the data symbol block” and “detecting the received symbol block to obtain the detected symbol block are vague and indefinite.

For claims 27 and 44 are rejected because of their dependency from claim 26.

For claim 27 the recited limitation “a detector operative to obtain a block of received symbols for the data symbol block and to detect the received symbol block to obtain the detected symbol”. It is not clear what type detector is used and what is being detected.

For claim 28 the recited limitation “a detector operative to obtain a block of received symbols for the data symbol block and to detect the received symbol block to obtain the detected symbol”. It is not clear what type detector is used and what is being detected.

For claim 28 the recited limitation “receiving a block of received symbols is vague indefinite. It is not clear what the received symbols are. Also, there is no clear distinction between detected and received symbol blocks.

For claim 28 the recited limitation “a last iteration” is vague and indefinite. It is not clear what type the last iteration is.

For claims 29, 31, 32, and 45 are rejected because of their dependency from claim 28.

For claim 32 the number of iteration N greater or equal to 1 makes vague and indefinite. N being grater than 1 creates infinite number of possibilities.

For claim 33 the recited limitation “a last iteration” is vague and indefinite. It is not clear what type the last iteration is.

For claim 33 the recited limitation " a detector to detect all received symbol blocks received for the data packet to obtain detected symbol blocks, one detected symbol block for each received symbol block” is vague and unclear. If a symbol block is received then it is detected. Therefore, it is unclear what kind of detector the limitation is claiming.

For claims 34 and 46 are rejected because of their dependency from claim 33.

For claim 35 the recited limitation “a last iteration” is vague and indefinite. It is not clear what type the last iteration is.

For claims 36 and 47 are rejected because of their dependency from claim 33.

For claim 37 the recited limitation “a last iteration” is vague and indefinite. It is not clear what type the last iteration is.

For claim 37 the recited limitation “N iteration where N is one or greater” is vague and indefinite. N being greater than one is indefinite loop.

For claims 38 and 48 are rejected because of their dependency from claim 37.

For claim 39 recites the limitation “transmitting the data packet ".There is insufficient antecedent basis for this limitation in the claim.

For claim 40 the recited limitation “different redundancy” is vague and indefinite. It is not clear what different redundancy is.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3, 5-14, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Piirainen** in view of Applicant Admitted Prior Art **(AAPA).**

For claims 1, 10, 13, and 41 **Piirainen** teaches a method/transmitter/apparatus/processor readable medium of performing incremental redundancy (IR) (see column 7 line 46 “Incremental redundancy”) transmission in a wireless multiple-input multiple-output (MIMO) communication system(see column 2 line 6 “MIMO”), comprising:

obtaining a selected rate for data transmission on a MIMO channel between a plurality of transmit antennas at a transmitter and a plurality of receive antennas at a receiver;

processing a data packet in accordance with the selected rate to obtain a plurality of symbol blocks for the data packet (see abstract “symbol blocks” and column 9 lines 61-63 ”selection can be made according to the known principles of space-time block coding”);

transmitting a first symbol block from a-the plurality of transmit antennas at the transmitter to the plurality of receive antennas at the receiver, wherein the first symbol block is one of the plurality of symbol blocks (see abstract “symbols are divided into blocks and transmitted from transceivers to transceivers”); and

transmitting remaining ones of the plurality of symbol blocks, one symbol block at a time, until the data packet is recovered correctly by the receiver or all of the plurality of symbol blocks are transmitted((see abstract “symbols are divided into blocks and transmitted from transceivers to transceivers and checking whether the blocks were received successfully and combining blocks”).

Piirainen does not expressly teach obtaining a selected rate for data transmission on a MIMO channel between a plurality of transmit antennas at a transmitter and a plurality of receive antennas at a receiver limitation.

However, **AAPA** teaches this limitation (see paragraph 6 “a rate may indicate data rate, coding scheme, modulation scheme, packet size, and so on”).

Thus, it would have been obvious to the person of ordinary skill in the art at time of invention to use the **AAPA** prior art teaching in the data transmission and reception system of **Piirainen**.

This combination is possible because both **Piirainen** and **AAPA** deal with the same problem of retransmission of symbol block when the received block is in error.

The motivation for this combination is to improve the throughput of MIMO system.

For claims 3, 11-12, and 14 **Piirainen** teaches a method/transmitter/apparatus, wherein the processing includes

encoding the data packet in accordance with a coding scheme indicated by the selected rate to obtain a coded packet (see abstract column 9 lines 61-63 “selection is made based on STBC”, Fig. 4 “packet coding; division into bursts, and division of burst into groups”),

partitioning the coded packet into a plurality of coded subpackets (see abstract column 9 lines 61-63 “selection is made based on STBC”, Fig. 4 “packet coding; division into bursts, and division of burst into groups”), and

modulating the plurality of coded subpackets in accordance with a modulation scheme indicated by the selected rate to obtain the plurality of symbol blocks (see column 1 lines 28-29 “data rate and modulation” and column 4 line 18 “CDMA and FDMA”).

For claim 5 **Piirainen** teaches a method, further comprising:

receiving a negative acknowledgment (NAK) (see Fig. 4 “NACK”); and

transmitting a next symbol block among the remaining ones of the plurality of symbol blocks in response to receiving the NAK (see Fig. 4 “NACK”).

For claim 6 **Piirainen** teaches a method, wherein the MIMO system utilizes orthogonal frequency division multiplexing (OFDM), and wherein each of the plurality of symbol blocks is transmitted from a plurality of subbands of the plurality of transmit antennas, if at all (see Fig. 3 “MIMO data transmission” and column 4 line 18-19 “OFDM”).

For claim 7 **Piirainen** teaches a method, wherein at least two data packets are each processed in accordance with the selected rate to obtain at least two pluralities of symbol blocks, one plurality of symbol blocks for each data packet, and wherein at least two symbol blocks for the at least two data packets are transmitted simultaneously from the plurality of transmit antennas to the plurality of receive antennas (see abstract “dividing symbols to be transmitted into blocks and transmitting blocks using each antenna and the division is based on the number of antennas” and column 9 line32 “simultaneously transmission”).

For claim 8 **Piirainen** teaches a method of performing incremental redundancy (IR) transmission in a wireless multiple-input multiple-output (MIMO) communication system (see Fig. 3 “MIMO transmission”), comprising:

processing a data packet to obtain a plurality of symbol blocks for the data packet (see abstract “plurality of symbol blocks have been obtained and processed");

transmitting a first symbol block from a plurality of transmit antennas at a transmitter to a plurality of receive antennas at a receiver, wherein the first symbol block is one of the plurality of symbol blocks (see abstract “transceiver, symbol blocks and antennas”); and

transmitting remaining ones of the plurality of symbol blocks, one symbol block at a time, until the data packet is recovered correctly by the receiver or all of the plurality of symbol blocks are transmitted, wherein the MIMO system utilizes orthogonal frequency division multiplexing (OFDM), and wherein each of at least two symbol blocks for at least two data packets is transmitted diagonally across a plurality of subbands and the plurality of transmit antennas (see Fig. 3 “MIMO data transmission illustration”, column 4 line 19 “OFDM” and column 7 lines 5-6 “diagonal transmission”).

For claim 9 **Piirainen** teaches a method, wherein the MIMO system utilizes orthogonal frequency division multiplexing (OFDM), wherein Np data packets are each processed in accordance with the selected rate to obtain Np pluralities of symbol blocks, one plurality of symbol blocks for each data packet, where Np is equal to or greater than one and is selected based on a rank of the MIMO channel, and wherein Np symbol blocks for the Np data packets are transmitted simultaneously diagonally across a plurality of subbands and the plurality of transmit antennas (see Fig. 3 “MIMO data

transmission illustration”, column 4 line 19 “OFDM”, and column 6 lines 55-60 “formula 1”).

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Piirainen** in view of Applicant Admitted Prior Art **(AAPA)** further in view of **Tarokh** et al. (US 2004/0057530 A1).

For claim 4 **Piirainen** does not teach a method, wherein the coding scheme is a Turbo code, and wherein he first symbol block includes systematic bits for the data packets. However, **Tarokh** teaches this limitation (see paragraph 52” Turbo code”). Thus, it would have been obvious to a coding scheme such as Turbo code taught by **Tarokh** in the encoder of Piirainen. This combination is possible because **Piirainen** uses the encoder of **Tarokh** (see column 9 line 63 **Tarokh**”).

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 15-19, 22-24, 26-29, 31-40, and 49 are rejected under 35 U.S.C. 102 (e) as being anticipated by **Tarokh (US 2004/0057530 A1).**

For claims 15, 23, 26, and 49 **Tarokh** teaches a method/receiver/apparatus/processor-readable medium of receiving an incremental redundancy (IR) transmission in a wireless multiple-input multiple-output (MIMO) communication system (see abstract “IR” and paragraph 8 “MIMO”), comprising:

obtaining a block of detected symbols for a data packet, wherein the detected symbol block is an estimate of a data symbol block transmitted from a plurality of transmit antennas at a transmitter and received by a plurality of receive antennas at a receiver, and wherein the data symbol block is one of a plurality of data symbol blocks generated for the data packet (see abstract “a transmitter sends packets via blocks of symbol to the receive”, Fig. 5 “channel estimation, STC Decoder, Channel decoder, and Error detection”, paragraph 9 “detection algorithm”, paragraph 74 “detect decoded errors”, and paragraph 8 “antennas”);

decoding all detected symbol blocks obtained for the data packet to provide a decoded packet (see abstract “decoding symbols”);

determining whether the decoded packet is correct or in error (see abstract “decoding of incorrectly received packets”); and

repeating the obtaining, decoding, and determining for another one of the plurality of data symbol blocks if the decoded packet is in error (see the abstract “ a hybrid ARQ feedback mechanism being used to repeat the obtaining, decoding, and error detection” and paragraph 24 “automatic repeat”),

For claims 16, 24, and 27 **Tarokh** teaches a method/receiver/apparatus, further comprising: obtaining a block of received symbols for the data symbol block; and detecting the received symbol block to obtain the detected symbol block (see abstract "obtained blocks of symbols are sent via transmitter to receiver", Fig. 5 CRC and ERROR DETECTION", and paragraph 63 "incoming bits, packets, or symbol are monitored and in case error HARQ algorithm is performed").

For claim 17 **Tarokh** teaches a method, wherein the detecting is based on a minimum mean square error (MMSE) detector, a maximal ratio combining (MRC) detector, or a linear zero-forcing (ZF) detector (see paragraph 80 "decoding techniques such as Zero-forcing & minimum square error").

For claim 18 **Tarokh** teaches a method, further comprising:
terminating the obtaining, decoding, and determining if the decoded packet is correct or if the plurality of data symbol blocks for the data packet have been transmitted (see paragraph 25 "feedback mechanism").

For claim 19 **Tarokh** teaches a method, further comprising:
sending an acknowledgment (ACK) for the data symbol block if the decoded packet is correct or a negative acknowledgment (NAK) if the decoded packet is in error (see paragraph 24 "ACK & NAK").

For claim 22 **Tarokh** teaches a method, further comprising:

deriving a signal-to-noise-and-interference ratio (SNR) estimate for each of the plurality of transmit antennas (see paragraph 59 “SNR and channel estimation function”),

computing an average SNR based on SNR estimates for the plurality of transmit antennas (see paragraph 59 “SNR with antenna” and paragraph 64 “SNR & CQI”),

determining a back-off factor (see paragraph 101 “delay diversity”), and

selecting a rate based on the average SNR and the back-off factor, for data transmission on a MIMO channel between the plurality of transmit antennas and the plurality of receive antennas (see paragraph 101 “delay diversity and data rate”).

For claims 28, 33, and 35 **Tarokh** teaches a method/receiver/apparatus of receiving an incremental redundancy (IR) transmission in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

receiving a block of received symbols for a data packet, wherein the received symbol block is for a data symbol block transmitted from a plurality of transmit antennas at a transmitter and received by a plurality of receive antennas at a receiver, and wherein the data symbol block is one of a plurality of data symbol blocks generated for the data packet see abstract “obtained bocks of symbols are sent to the receiver”, paragraph 60 "the symbols from incoming signal and channel estimates are provided to the decoder", and claim 21 f “STB is used to decode a first estimate for the original symbols”);

detecting all received symbol blocks received for the data packet to obtain detected symbol blocks, one detected symbol block for each received symbol block(see abstract and paragraphs 25, 42, 77, and 78 “symbol blocks are decoded to recover packets and determine whether there are errors to initiate HARQ”);

decoding the detected symbol blocks for the data packet to obtain decoder feedback information (see abstract “at the receiver is determined whether the received symbol is in error or not that determination information is used as a feedback to the transmitter”);

performing the detecting and decoding for a plurality of iterations, wherein the decoder feedback information from the decoding for a current iteration is used by the detecting for a subsequent iteration (see abstract “hybrid ARQ feedback mechanism” paragraph 83 “iterative MMSE and MLD, an be used to improve the system performance”); and

generating a decoded packet based on an output from the decoding for a last iteration among the plurality of iteration (see abstract “hybrid ARQ feedback mechanism” paragraph 83 “iterative MMSE and MLD, can be used to improve the system performance”).

For claims 29 and 36 **Tarokh** teaches a method/apparatus, further comprising:

determining whether the decoded packet is correct or in error (see abstract “error detection”, and

repeating the receiving, detecting, decoding, performing, and generating for another one of the plurality of data symbol blocks if the decoded packet is in error and if all of the plurality of data symbol blocks have not been transmitted (see abstract "multiple of symbol blocks being communicated between transmitter and receiver in case received error automatic request is initiated with feedback mechanism that can be repeated until the correct symbol, packet or bit are received ARQ, and error detection" .

For claim 31 **Tarokh** teaches a method, wherein the detecting is based on a minimum mean square error (MMSE) detector, a maximal ratio combining (MRC) detector, or a linear zero-forcing (ZF) detector (see paragraph 80 "decoding techniques such as Zero-forcing & minimum square error").

For claim 32 **Tarokh** teaches a method, wherein the MMSE detector is used for the detecting for N iterations and the MRC detector or the ZF detector is used for the detecting after N iterations, where N is one or greater "iterative MMSE and MLD, an be used to improve the system performance-N is definite").

For claim 34 **Tarokh** teaches a receiver, further comprising:

a controller operative to, if the decoded packet is in error and if all of the plurality of data symbol blocks have not been transmitted, direct the buffer to receive and store another received symbol block for another one of the plurality of data symbol blocks, and to direct the detector and decoder to perform detection and decoding on all

received symbol blocks received for the data packet to obtain the decoded packet (see paragraph 70 “received signals stored from the first transmission along the symbol received during retransmission” and paragraph 79 receiver store received symbols in case they are not properly decoded").

For claim 37 **Tarokh** teaches a method of receiving a data transmission in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

detecting received symbols for a data packet to obtain detected symbols (see abstract “decode the received blocks of symbols”);

decoding the detected symbols to obtain decoder feedback information (see abstract “at the receiver is determined whether the received symbol is in error or not that determination information is used as a feedback to the transmitter”);

performing the detecting and decoding for a plurality of iterations, wherein the decoder feedback information from the decoding for a current iteration is used by the detecting for a subsequent iteration, wherein the detecting is performed based on a minimum mean square error (MMSE) detector for first N iterations, where N is one or greater, and based on a maximal ratio combining (MRC) detector or a linear zero-forcing (ZF) detector for remaining ones of the plurality of iterations (see paragraph 80 “decoding techniques such as Zero-forcing & minimum square error”, paragraph 83 "iterative MMSE and MLD").; and

generating a decoded packet based on an output from the decoding for a last iteration among the plurality of iteration (see paragraph 83 “iterative MMSE”)

For claim 38 **Tarokh** teaches a method, wherein N is equal to one (see abstract the feedback mechanism perform as a loop when there is an error it feeds back the information to the transmitter the number of iteration can be programmed the number of iteration is at least one if there is an error. However, the number repetition can be set to any value 1 or greater than1.").

For claim 39 **Tarokh** teaches a method, further comprising:

transmitting the data packet and at least one additional data packet in an interlaced manner, wherein symbol blocks for each data packet are transmitted in slots spaced apart by a predetermined number of slots (see abstract "additional symbols are sent" Fig. 4 "SYMBOL INTERLEAVE & BIT INTERLEAVE" , Fig. 5 "SYMBOL DE-INTERLEAVE & BIT DE-INTERLEAVE" and paragraph 85 "next available time slot").

For claim 40 **Tarokh** teaches a method wherein the plurality of symbol blocks comprise different redundancy information for the data packet (see 23 "redundant parity symbols are transmitted, signal energy, or combination thereof are provided to the receiver, which can be used to correctly decode the transmitted data".

7. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Tarokh et al. (US 2004/0057530 A1)** in view of **Alouini et al. (US 6,304,593 B1).**

For claim 21 **Tarokh** teaches a method of receiving an incremental redundancy (IR) transmission in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

obtaining a block of detected symbols for a data packet, wherein the detected symbol block is an estimate of a data symbol block transmitted from a plurality of transmit antennas at a transmitter and received by a plurality of receive antennas at a receiver, and wherein the data symbol block is one of a plurality of data symbol blocks generated for the data packet (see abstract “obtained bocks of symbols are sent to the receiver”, paragraph 60 "the symbols from incoming signal and channel estimates are provided to the decoder", and claim 21 f “STB is used to decode a first estimate for the original symbols”);

decoding all detected symbol blocks obtained for the data packet to provide a decoded packet (see abstract and paragraphs 25, 42, 77, and 78 “symbol blocks are decoded to recover packets and determine whether there are errors to initiate HARQ”) ;

determining whether the decoded packet is correct or in error (see abstract and paragraphs 25 and 42 “symbol blocks are decoded to recover packets and determine whether there are errors to initiate HARQ”);

repeating the obtaining, decoding, and determining for another one of the plurality of data symbol blocks if the decoded packet is in error (see paragraph 24 “automatic repeat request (ARQ)”); and

Tarokh does not teach determining a rate for data transmission based on an average spectral efficiency for the plurality of transmit antennas.

However, **Alouini** teach this limitation (see column 2 lines 3-10 “average spectral efficiency definition and its relation to the data rate and bandwidth”). Thus, it would have been obvious to the person of ordinary skill in the art at the time of invention to use the teaching of **Alouini** with teaching Tarokh to arrive derive a formula for rate calculation.

This combination is possible because Tarokh teaches bandwidth and data rate and various coding, modulation, and decoding techniques.

The motivation for this combination is to optimize the overall throughput of MIMO data communication.

8. Claims 42-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Tarokh et al. (US 2004/0057530 A1)** in view of **Haustein et al. (US 7,366,520 B2).**

For claim 42-48 **Tarokh** teaches a method/receiver/apparatus/, further comprising:

obtaining channel estimates for a MIMO channel between the plurality of transmit antennas and the plurality of receive antennas (see paragraph 57”pilot signals are used for channel estimation”; and

Tarokh does teach selecting, based on the channel estimates, a rate for data transmission on the MIMO channel. However, **Haustein** teaches this limitation (see claim 1 “estimation of the channel matrix is determined at a symbol rate in dependence at the channel properties whereby making use of the reciprocity of MIMO channel”). Thus, it would have been obvious to the person of ordinary skill in the art at the time of

invention to use the information taught by **Haustein** to draw various rate from the MIMO channel estimation.

The motivation for this combination is to enhance the overall throughput of MIMO channel.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: **Thomas et al. (US 6,987,819 B2)** and **Agrawal et al. (US 6,873,606 B2).**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID OVEISSI whose telephone number is (571)270-3127. The examiner can normally be reached on Monday to Friday 8:00 AM to 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on (571) 272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Ricky Ngo/
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